# Seconds Reference with Quartz Accuracy

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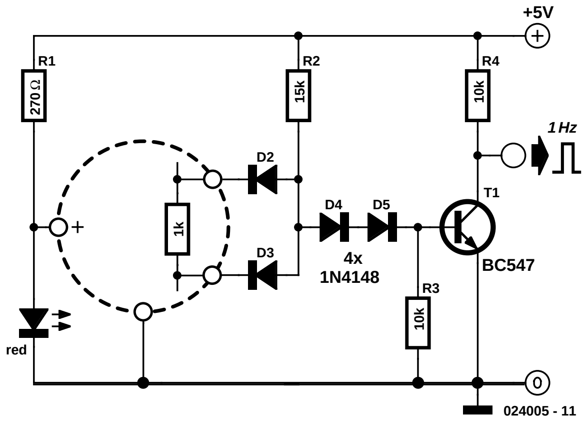
Simple analogue quartz watches or watch movements, which can be obtained inexpensively by mail order or at flea markets, contain a circuit that drives the watch motor with pulses at the rate of one per second. If you build such a watch movement into a small circuit, you have an inexpensive but nevertheless accurate 1-second frequency standard.

Watch movements normally have four pins: two for the supply voltage and two for the motor coil. Connect a 1-kΩ resistor in place of the motor coil. Negative pulses at a one-second rate with a duration of around 50 ms (depending on the type of movement) can now be found alternately on the two pins. These are combined using an OR gate made from discrete components. The output of the circuit thus provides positive pulses, buffered by T1, for use in other applications.

This circuit can be used with any desired supply voltage, since the supply voltage for the watch movement is tapped off from a red 20-mA LED fitted with a suitable series resistor.



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